REQUIREMENTS REPORT
COMPUTER SOFTWARE SYSTEM FOR A
SEMI-AUTOMATIC PIPE HANDLING SYSTEM
AND FABRICATION FACILITY.
FOR
AVONDALE SHIPYARDS, INC.

BY: IBM

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SECTION I

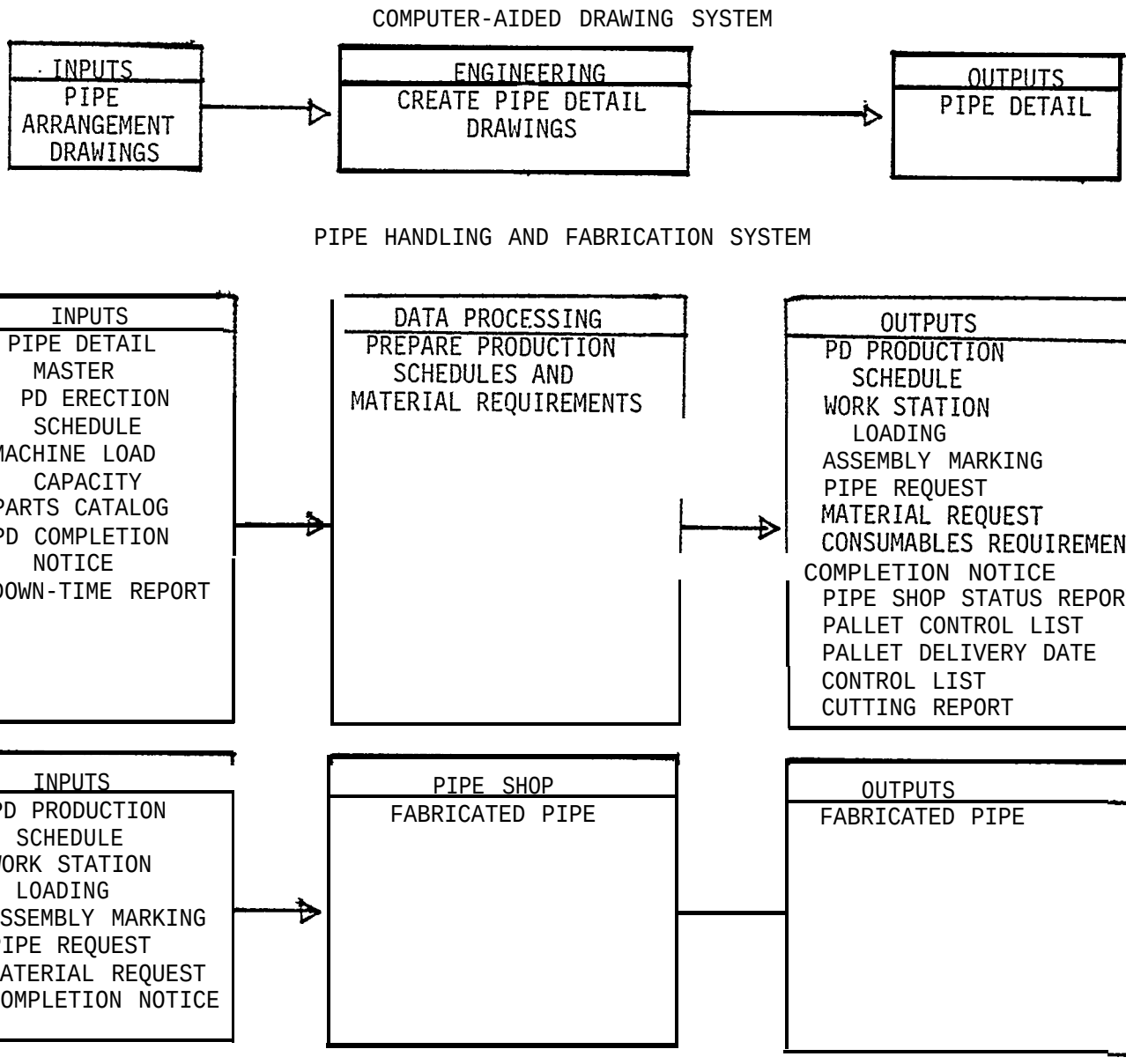
EXECUTIVE SUMMARY

1. INTRODUCTION

Avondale Shipyards, Inc., has entered into a detailed study to design a cost-effective and semi-automatic method of fabricating pipe which will reduce the labor, material handling, storage space and required fabrication area.

This report is to present the requirements of the computer software that must be developed to create Pipe Detail Drawings and to support the processing of the Pipe Detail Drawings through the Pipe Shop. These requirements are separated into two major categories, COMPUTER AIDED DRAWINGS SYSTEM and PIPE HANDLING AND FABRICATION SYSTEM. Section II of this report describes the application in terms of work flow and functions to be performed. Section III describes the significant information that is required. Section IV identifies the significant design constraints that must be considered during the design of the system.

2. APPLICATION OVERVIEW



COMPUTER-AIDED DRAWING SYSTEM (CAD)

The Engineering Department will create daily the pipe Detail Drawings from the Pipe Arrangement Drawings. These drawings will be made with the aid of an existing Computer Graphic Display System that will be modified to meet Avondale Shipyards' special needs. This graphic-system will create a master file of Pipe Details that will be used by the PIPE HANDLING AND FABRICATION SYSTEM, which in turn will feed back information to CAD, for the actual printing of the Pipe Details.

PIPE HANDLING AND FABRICATION SYSTEM (PHFS)

The purpose of the PHFS is to aid in the scheduling and operations of the Pipe Shop. To accomplish these, two major inputs must be provided. The first of these is the file of Pipe Detail Drawings (PDS) that will be produced by CAD. The second major input is the Master Erection Schedule (Piping Part only).

The PHFS will use these two major sources as input and other preloaded system master files to schedule work through the Pipe Shop. The other system master files will contain data on each of the machines in the Pipe Shop, such as load capacity, maximum pipe size, and other special information about each machine. They will also contain a catalog of all parts that are used by the Pipe Shop.

The PHFS will also produce information on daily material requirements, assembly marking information, final disposition of PDs, and a Pipe Shop Status Report.

3. OBJECTIVES

COMPUTER-AIDED DRAWING SYSTEM

The objective of CAD is to offset any major increase in the Engineering staff necessary to provide the drawing and other data in a timely manner.

PIPE HANDLING AND FABRICATION SYSTEM

The object of PHFS is to allow for the concurrent preparation of:

* Shop Production Schedules
* Pipe Requirements
* Material Schedule Requirements
* Work Station Loadings
* Assembly Marking Information
* Final Assembly Disposition

Another objective of the PHFS is to control the storage, retrieval and site delivery of palletized piping units which are produced in the Pipe Shop.

SECTION II
APPLICATION DESCRIPTION

SECTION II

APPLICATION DESCRIPTION

COMPUTER-AIDED DRAWING SYSTEM

1. Create Pipe Drawings and PD Graphic File

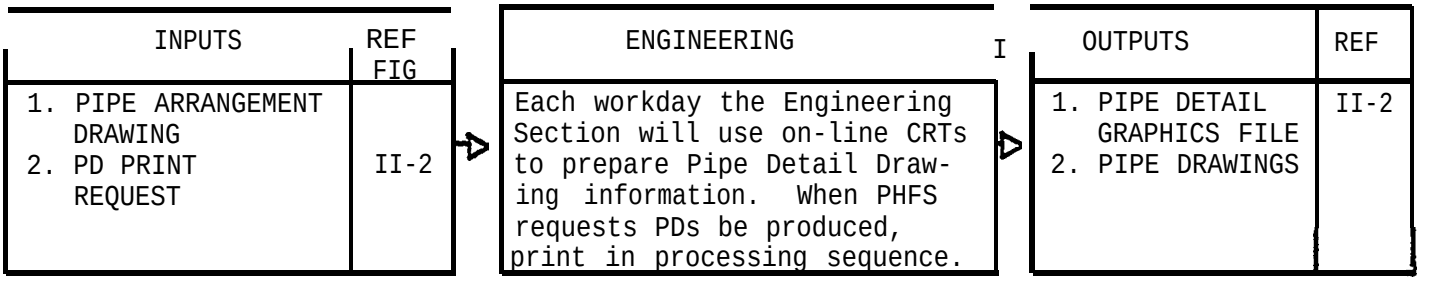
PIPE HANDLING AND FABRICATION SYSTEM

2. Pipe Detail Master File Additions from CAD
3. Pipe Shop Scheduling
4. Pipe Shop Forecasting
5. Parts Catalog Maintenance
6. Machine Loading Maintenance
7. Erection Schedule Maintenance
8. Pipe Detail Master File Maintenance
9. PD History File Maintenance
10. PD Production Schedule File Maintenance
11. Pipe Shop Scheduling System Inquiries
12. Pipe Shop Status Report
13. PD Reserve Status
14. Palletizing
15. Master Material Maintenance
16. PD Reserve Status File Maintenance
17. Machine Down Time Maintenance
18. PD Production Schedule Change Request File Maintenance
19. Pipe Detail Master File Additions from Manual PDs

COMPUTER-AIDED DRAWING SYSTEM

1. Create Pipe Drawings and PD Graphic File

Figure II-1



The Engineering Department will use as input the Pipe Arrangement Drawings that are created for each Piping System within the hull. (Reference Section III-l-A) Using a Graphics Display Screen and a Master File of three dimensional-shaped pipe and parts, the Engineers will create Pipe Detail Drawings. These drawings will include a complete list of pipe, including cut lengths and other material required to fabricate the assembly represented by the drawing. It will also include information on surface preparation, painting required, X-ray information, and all other operations required to complete the PD. These drawings, with associated information, will be used to create the Pipe Detail Graphics File. (Reference Section III-5-A) This file is then used by the Pipe Shop Production Control System. The PHFS will return information to the CAD system for the actual printing of the PDs by use of the PD Print Request File. (Reference Section III-5-F) The CAD system will print the PDs in the sequence they are to be processed through the Pipe Shop (Reference Section III-2-T)

2. Pipe Detail Master File Additions from CAD

Figure II-2

INPUTS	REF FIG	DATA PROCESSING	OUTPUTS	REF
1. PIPE DETAIL GRAPHICS FILE 2. PD MASTER ERECTION SCHEDULE FILE	II-1	PHFS will take the PD information produced by Engineering and update the PD Detail Master File.	1. PIPE DETAIL MASTER FILE	

As required, whether daily or just before production scheduling the PHFS will extract completed PDs from the Pipe Detail Graphics File. The PD Master Erection Schedule File will be used to expand the record into the Pipe Detail Master. This function may be used to obtain PDs as soon as they are complete for use in forecasting.

* Pipe Detail Graphics File - File of PDs created by Engineering. Reference Section III-5-A.

* Pipe Detail Master File - File of PDs pulled from the Pipe Detail Graphics File and extended by the system. Reference Section III-5-B.

* PD Master Erection Schedule - File of PDs for each job showing the start and completion dates for fabrication and installation of each pipe assembly. Reference Section III-5-C.

3. Pipe Shop Scheduling

Figure II-3

INPUTS	REF FIG
1. PIPE DETAIL MASTER FILE	II-4
2. PARTS CATALOG	II-4
3. MACHINE LOADING	II-4

DATA PROCESSING
Every second workweek the PHFS will generate production schedules and pipe and material requirements for two weeks of production beginning two weeks in advance of the schedule preparation. Request CAD to print PDs.

OUTPUTS	REF FIG
1. PD PRODUCTION SCHEDULE	
2. WORKSTATION LOADING	
3. PIPE REQUEST	
4. MATERIAL REQUEST	
5. PD PRINT REQUEST	II-1
6. CONSUMABLE REQUIREMENTS	
7. ASSEMBLY MARKING INFORMATION	
8. PD COMPLETION NOTICE	
9. PIPE CUTTING	
10. PD PRODUCTION SCHEDULING FILE	
11. WORKSTATION LOADING FILE	
12. PIPE DETAIL MASTER FILE	

Every two weeks the Pipe Shop Production Control System will produce production schedules and material requirements reports.

* Pipe Detail Master File - File of PDs pulled from the Pipe Detail Graphics File and extended by the system. Reference Section III-5-B.

* Parts Catalog - File of all parts used by the Pipe Shop. Reference Section III-5-D.

* Machine Loading File - File on each work station in the Pipe Shop with capacity and pipe sizes which it will handle. Reference Section III-5-E.

Using PD fabrication start and end dates and the Machine Loading File, the system will calculate a daily schedule that covers a two-week work plan. This calculation includes maximizing pipe usage to reduce scrap (Pipe Cutting Report) and optimizing the work stations by determining the sequence operations that are to be performed and scheduling to minimize the resetting of machines (Work Station Loading Report).

* PD production Schedule - This is a list of all PDs to be processed each day in processing sequence. It will show the work stations that will be used for fabrication of the PD and the path each cut length will travel through the Pipe Shop. The major stations that might process a PD are:

Each pipe:	Storage rack to conveyor
	Surface preparation
	Measuring, cutting & edge preparation
Each cut length:	Marking
	Flange fitting & welding
	Flange finishing
	Bending
	Contour cutting
	Elbow & Branch Pipe assembling & welding
	Various positioners, manipulators & welding
	X-ray facilities
	Special handling area

The pipe used for the fabrication will travel through the shop by means of a conveyor system. The pipe may flow in either direction depending on the next station to which it is routed. Reference Section III-2-A.

* Work Station Loading - This document is produced for each work station listing the PDs and/or PD cut length to be processed for each scheduled workday. These will be listed in the sequence that they will be processed at the station. Each document will contain complete operation instructions for processing each PO and/or PD cut length through that station. A complete list of other fittings and accessories will be included. A routing code will show for forwarding the PD to the next work station. The work station instruction may be in the form of numerical control instructions, push button instructions, or manual instructions. As each PD is processed through the work station, the document is checked to show it has been completed. At the end of each shift, the documents are collected and routed to Data Processing for use in preparing the Shop Status Report. Reference Section III-2-B.

* Pipe Request - Thi s report will indicate the amount of each type and size of pipe that must be loaded into the pipe storage racks to handle a two-week workload. Reference Section III-2-C.

* Material Request - This report will show the total numbers of each type of material (Piecemark numbers) required for the two-week schedule and the number of each type for each work station by each day. This report will be used by the Pipe Shop to ensure all material is on hand for each day’s work and as a request for warehousing to release the material to the Pipe Shop. Reference Section III-2-D.

* Assembly Marking Information - This report will be a listing of each PD to be processed each day with its PD number, job number, and hull number. This listing will be used to make tags for each piece of pipe going through the Pipe Shop. Reference Section III-2-E. Note: Field run pipe is not identified by PD number and will require identification.

* PD Completion Notice - This listing will show all PDs that should be completed on each production day. It will be used tore-enter into the system the actual completion date of each PD. Reference Section III-2-F.

* Consumable Requirements - This report will show the total quantity of each consumable item that will be required, based on machine specifications, to produce the two-week work plan. Reference Section III-2-P.

* The scheduling system will also produce the PD Print Request File that will go to the Graphic Piping System for the actual printing of each PD in the sequence they are to be processed. Reference Section III-5-F.

* Pipe Cutting Report - This report shows the sequence the pipe should be cut to maximize pipe usage to reduce scrap and to minimize the resetting of machines to handle different sizes of pipe. The cutting station operator will use this report to select pipe in sequence from the pipe rack. The report is in sequence by pipe specifications (size, class, grade) showing all of the PDs and cut lengths that may be cut from each pipe. Reference Section III-5-2-V.

* PD Production Schedule File - This file is used for displaying the Production Schedule on inquiry. Reference Section III-5-H.

* Work Station Loading File - This file is used for displaying the Work Station Loading Report. Reference Section III-5-I-

4. Pipe Shop Scheduling Forecasting

Figure II-3

INPUTS	REF FIG	PIPE SHOP/DATA PROCESSING	OUTPUTS	REF FIG
1. PD SCHEDULE FORECASTING REQUEST 2. PIPE DETAIL MASTER FILE 3. PD MASTER ERECTION SCHEDULE 4. PARTS CATALOG 5. MACHINE LOADING	II-5	When the need arises for the Pipe Shop Superintendent to look at a Production Schedule other than the normal two weeks this request will be made. The system will produce the Production Schedule and Work Station Loading based on the request.	1. PD PRODUCTION SCHEDULE FORECAST 2. WORKSTATION LOADING FORECAST	

The Pipe Shop Superintendent may have the occasion to review Production Schedules and Work Station Loadings based on something other than the normal two-week schedule. In addition to projecting the future work load, this forecasting might also be used after input of Manual PDs to compare the effect of these additions with the Production Schedule without altering the Production Schedule. A request is completed and sent to the Data Processing Department. The variations of schedules that may be requested are:

* Specific job/hull numbers
* Specific time frames - from one day to an infinite number of days
* Varying the scheduled production hours per day
* Change priority codes of specific PDs

The same input files will be used for Schedule Forecasting that are used for the regular Production Schedule. The same processing will be done, except it will use the new variable that was entered by the Pipe Shop Superintendent. See the PD Schedule Forecasting Request (Section III-1-C). The two outputs of the Production Schedule Forecasting will be the PD Production Schedule

Forecast and the Work Station Loading Forecast. Reference Sections III-2-G and III-2-H. No master files are altered.

5. Parts Catalog Maintenance

Figure II-5

INPUTS	REF FIG
1. PARTS CATALOG UPDATE	

PURCHASING/DATA PROCESSING
When new manufacturers or new material types are used, the Parts Catalog will be updated with new parts.

OUTPUTS	REF FIG
1. UPDATED PARTS CATALOG	II-3 II-4

Any time that a new material part or new type or size of pipe is to be used by the Pipe Shop, this information must be entered into the Parts Catalog before it can be used by the Engineering Section. It must be assigned a unique Piecemark Number. The Engineering Department will fill out the required information and forward it to Data Processing. Reference Section III-l-D. Data Processing will then update the Parts Catalog. Reference Section III-5-D.

6. Machine Loading Maintenance

Figure II-5

INPUTS	REF FIG	DATA PROCESSING	OUTPUTS	REF FIG
1. MACHINE LOADING UPDATE		As often as required, the Machine Loading Maintenance must be run to update the Machine Loading File.	1. MACHINE LOADING FILE 2. MACHINE LOADING REPORT	

As often as required, the Machine Loading Maintenance must be run to update the Machine Loading File (Section III-5-E) using the Machine Loading Update input (Section III-l-F).

This file contains all the necessary specifications pertaining to the capabilities of each machine, i.e., welding, bending, threading, pipe-handling size, type, class, other consumable materials required, etc.

The Machine Loading Report (Section III-2-W) is produced for audit purposes and verification.

7. Erection Schedule Maintenance

Figure II-7

INPUTS	REF FIG	DATA PROCESSING	OUTPUTS	REF FIG
1. PIPE DETAIL MASTER FILE 2. MASTER ERECTION SCHEDULE		A PD Master Erection Schedule will be maintained for each Job and Hull Number.	1. PD MASTER ERECTION SCHEDULE FILE 2. PIPE DETAIL MASTER FILE	

As all information becomes available, a PD Master Erection Schedule will be maintained for each Job/Hull Number as required. The input files are:

* Pipe Detail Master File - This file contains all the schedule information for each PD. Any change to the PD Master Erection Schedule must reflect in the Pipe Detail Master File. Reference Section III-5-B.

* PD Master Erection Schedule - This file contains the fabrication and installation start and ending dates for each PD. Reference Section III-5-C.

* Master Erection Schedule - This input reflects start and completion dates for pipe detail fabrication only and is selected from the Master Erection Schedule. Reference Section III-I-B.

8. Pipe Detail Master File Maintenance

Figure II-8

INPUTS	REF FIG	DATA PROCESSING	OUTPUTS	REF FIG
1. PIPE DETAIL GRAPHICS FILE 2. PIPE DETAIL MASTER FILE 3. PD COMPLETION NOTICE 4. WORKSTATION PD COMPLETION		Periodic updates of the PD Master File are required to reflect the changes in Master File for later use.	1. PIPE DETAIL MASTER FILE	

Periodic updates to the Pipe Detail Master File are required in order to provide current status information on all PDs. This update reflects additions, changes, deletions, and completions. Input files are:

* Pipe Detail Graphics File - This file will reflect only additions (Section III-5-A)

* Pipe Detail Master File - represents the most current file (Section III-5-B)

* PD Completion Notice - signifies the date that this PD has been completed (Section III-l-G)

* Work Station PD Completion - signifies the date that this PD operation has been completed at a work station

9. PD History File Maintenance

Figure II-9

INPUTS	REF FIG	DATA PROCESSING	OUTPUTS	REF FIG
1. PIPE DETAIL MASTER FILE 2. PD HISTORY FILE		The PD History is updated to provide a history record of completed PDs.	1. PD HISTORY FILE	

A PD history file is updated and maintained to aid in audits and research. The files used are:

* Pipe Drawing Detail Master - This file contains all information and dates pertaining to each PD. Reference Section III-5-B.

* PD History File - contains all detail information and dates for PDs which were previously completed. Reference Section III-5-G.

10. PD Production Schedule File Maintenance

Figure 11-10

INPUTS	REF FIG	DATA PROCESSING	OUTPUTS	REF FIG
1. PD PRODUCTION SCHEDULE CHANGE REQUEST FILE	11-18	When the need arises for the Pipe Shop Superintendent to revise the schedule, he will submit the schedule change request. The system will produce the entire Production Schedule, Work Station Loading Pipe & Material Requests and PD Print Request with the changes incorporated.	1. PD PRODUCTION SCHEDULE	II-3
2. PIPE DETAIL MASTER FILE	II-3		2. WORK STATION LOADING	II-3
3. PD MASTER ERECTION SCHEDULE			3. PIPE REQUEST	II-3
4. PARTS CATALOG			4. MATERIAL REQUEST	II-3
5. MACHINE LOADING.	II-3		5. PD PRINT REQUEST	11-3
			6. CONSUMABLE REQUIREMENTS	
			7. ASSEMBLY MARKING INFORMATION	
			8. PD COMPLETION NOTICE	
			9. PIPE CUTTING	
			10. PD PRODUCTION SCHEDULE FILE	
			11. WORKSTATION LOADING FILE	
			12. PIPE DETAIL MASTER FILE	

The Pipe Shop Superintendent may have the occasion to change the Production Schedule. When this need arises, a schedule change request is submitted to Data Processing. A complete new/revised Production Schedule will be produced along with all other related outputs. The same input files are used for schedule changes that were used for the Production Schedule. The Schedule Change Request File is used as input in addition to the normal files. Output will also be the same as the Production Schedule and the Schedule Changes will have been incorporated. Refer to Figure II-3. Pipe Shop Scheduling.

11. System Inquiries

Figure II-11

INPUTS	REF FIG
1. PIPE DETAIL MASTER FILE 2. PD PRODUCTION SCHEDULE FILE 3. PD MASTER ERECTION SCHEDULE FILE 4. MASTER MATERIAL FILE 5. RESERVE STATUS FILE 6. PALLETIZING FILE 7. CONSUMABLE FILE 8. PARTS CATALOG 9. WORKSTATION LOADING FILE	

ASI DEPARTMENTS	OUTPUTS	REF FIG
When the need arises for quick information about a specific item of data in one of the PHFS files, the ASI departments will have the ability to inquire on-line into any of the nine data files within the system	SCREEN RESPONSE	

The ASI departments will have the ability, by use of an on-line terminal, to get quick information about items of information contained in the nine basic files used by the Pipe Handling and Fabrication System.

* PD Detail Master File Display - A display of all information contained on the file about any given PD. Reference Section III-3-A.

* PD Production Schedule Display - A display of the schedule of any given PD or all PDs for any given date. Reference Section III-3-B.

* PD Master Erection Schedule Display - A display of the fabrication and install start and end dates of any given PD. Reference Section III-3-C.

* Parts Catalog Display - A display of all information on file about any given Piecemark Number. Reference Section III-3-D.

* Work Station Loading Display - A display of the schedule of any given PD for a particular machine or all PDs for a particular machine for any given day. Reference Section III-3-E.

* Master Material Display - A Display of any material by piecemark on the file and the Pipe Arrangement Drawings associated with it or by the Pipe Arrangement Drawing Number and all material associated with it. Reference Section III-3-F and Section III-3-G.

* Reserve Status Display - A display of any PD on the Reserve Status File. Reference Section III-3-H.

* Consumable Display - A display of any consumable item on the file. Reference Section III-3-K.

* PD Palletizing Display - A display of any PD on the Palletizing File. Reference Section III-3-J.

12. Pipe Shop Status Report

Figure 11-12

INPUTS	REF FIG	DATA PROCESSING	OUTPUTS	REF FIG
1. PIPE DETAIL MASTER FILE 2. WORKSTATION LOADING FILE 3. PD PRODUCTION SCHEDULE FILE 4. MACHINE LOADING FILE		A Daily Pipe Shop Status Report will be generated by the system showing the status of each PD for the day and any machine lost time.	1. PIPE SHOP STATUS REPORT	

Each production day the Pipe Shop will enter the PD Completion Notices, Machine Down-Time Update, and the Work Station PD Completion input. After these have been entered, the system will generate the Pipe Shop Status Report. (Section III-2-I).

* Pipe Shop Status Report - This report is comprised of the following parts:

Part 1 - All completed PDs in the sequence the PDs were scheduled on the PD Production Schedule

Part 2- In process PDs in the same sequence as completed PDs with the last Work Station completed and the next work station

Part 3 - By work station, all PDs in process

Part 4 - By work station, Machine Down Time

* Pipe Detail Master File - (Section III-5-B)

* Work Station Loading File - (Section III-5-I) for Work Station/PD sequence.

* PD Production Schedule File - (Section III-5-H) for PD sequence.

* Machine Loading File - (Section III-5-E) for Machine Down Time.

13. PD Reserve Status

Figure II-13

INPUTS	REF FIG	DATA PROCESSING	OUTPUTS	REF FIG
1. PD RESERVE STATUS FILE 2. PD MASTER ERECTION SCHEDULE		The system will generate a Reserve Status Report each production schedule cycle.	1. PD RESERVE STATUS REPORT 2. PD RESERVE STATUS FILE	

Every week the system will generate a PD Reserve Status Report. This report will list all PDs that are still in reserve status in fabrication date sequence. The report will also list those PDs that have been finalized and marked for deletion from the PD Reserve Status File. These records will be deleted from the file.

* PD Reserve Status File - Reference Section III-5-L.

* PD Master Erection Schedule - Reference Section III-5-C. Contains fabrication start and end dates.

* PD Reserve Status Report - Reference Section III-2-H.

14. Palletizing

Figure 11-14

INPUTS	REF FIG	DATA PROCESSING	OUTPUTS	REF FIG
1. PIPE DETAIL MASTER FILE 2. PD PALLETIZING FILE		The system will create the Pallet Control List and the Pallet Delivery Date Control List.	1. PALLET. CONTROL LIST 2. PALLET DELIVERY DATE CON-TROL LIST	

At the close of each production day when the PD Completion Notices are entered into the system, the PALLET CONTROL LIST (Section III-2-J) will be generated. This will be a list of all PDs completed that day which should go to storage. As Material Control stores the pipe pieces, they will update the PD Palletizing File (Section III-5-K) with the storage location. The system will generate a PALLET DELIVERY DATE CONTROL LIST at the time the pallet should be delivered to the job site. Reference Section III-2-K.

15. Master Material Maintenance

Figure II-15

INPUTS	REF FIG
1. PD MASTER MATERIAL FILE 2. LIST OF MATERIAL UPDATE 3. MATERIAL OVER/ UNDER INPUT 4. MATERIAL DELIVERED 5. PARTS CATALOG	

ASI DEPARTMENTS
Using inputs from Engineering and Material Control, the system will maintain the status of all materials required by the Pipe Shop.

OUTPUTS	REF FIG
1. LIST OF MATERIALS 2. MATERIAL TO BE ORDERED 3. MATERIAL OVER/ UNDER 4. MATERIAL ADDITIONAL PURCHASE 5. MATERIAL DELIVERED	

As Engineering completes the List of Materials for a Pipe Arrangement Drawing, they will forward it to Data Processing for update to the PD Master Material File.

Material Control, with the aid of system-generated reports, will then maintain the status of the material until the time it is used by the Pipe Shop.

* List of Materials - Reference Section III-2-N.
* Material To Be Ordered - Reference Section III-2-O.
* Material Over/Under - Reference Section III-2-Q.
* Material Additional Purchase - Reference Section III-2-R.
* Material Delivered - Reference Section III-2-S.
* List of Material Update - Reference Section III-l-E.
* Material Over/Under Input - Reference Section III-l-J.
* Material Delivered - Reference Section III-l-K.
* Parts Catalog - Reference Section III-5-D. Used for Piecemark Description.

16. PD Reserve Status File Maintenance

Figure II-16

INPUTS	REF FIG	DATA PROCESSING	OUTPUTS	REF FIG
1. PIPE DETAIL GRAPHICS FILE 2. PD RESERVE STATUS FILE		When Engineering makes incomplete PDs as reserved, the PD data is added to the PD Reserve Status File. When the reserved PI) is completed in the PD Graphics File, the PD is marked for deletion in the PD Reserve Status File.	1. PIPE DETAIL GRAPHICS FILE 2. PD RESERVE STATUS FILE	

Pipe detail drawings that are scheduled to be complete but have engineering changes pending are marked as reserved on the Pipe Detail Graphics File. Reserved PD records are generated and added to the PD Reserve Status File for tracking. When the reserved PD is finalized in the Pipe Detail Graphics File, its associated record is marked for deletion in the PD Reserve Status File. This may be done by changing the Reserve Status Code. The record is not deleted until the printing of the Reserve Status Report.

* Pipe Detail Graphics File - File of PDs created by Engineering. Reference Section III-5-A.

* PD Reserve Status File - File of PDs to be scheduled for production which are pending or reserved because of missing data. Reference Section III-5-L.

PIPE HANDLING AND FABRICATION SYSTEM

17. Machine Down Time Maintenance

Figure II-17

INPUTS	REF FIG
1. MACHINE DOWN TIME UPDATE 2. MACHINE LOADING FILE	

PIPE SHOP/DATA PROCESSING
The Pipe Shop will submit machine down time data for a work station.

OUTPUTS	REF FIG
1. MACHINE LOADING FILE	

The Pipe Shop will submit to Data Processing the date and time a machine is down at a work station and also the date and time the machine is operational again. This data is maintained in the Machine Loading File for capturing performance history. Note that if the Machine Down Time is to be used as a factor in scheduling, an estimated time when the machine will be operational must also be input. The Machine Down Time is reported on the Pipe Shop Status Report. See Figure II-12.

* Machine Down Time Update - This input contains the date and time a machine is down and/or the date and time a machine is started again.

18. PD Production Schedule Change Request File Maintenance

Figure II-18

INPUTS	REF FIG	PIPE SHOP/DATA PROCESSING	OUTPUTS	REF FIG
1. SCHEDULE CHANGE REQUEST		To change the Production Schedule, the Pipe Shop Superintendent submits a Schedule Change Request to Data Processing.	1. PD PRODUCTION SCHEDULE CHANGE REQUEST FILE	11-10

The Schedule Change Request input is put to a file for input to the PD Production Schedule File Maintenance function. The change may be selecting specific jobs, time frames, hours of shop operation, and/or PD priority codes.

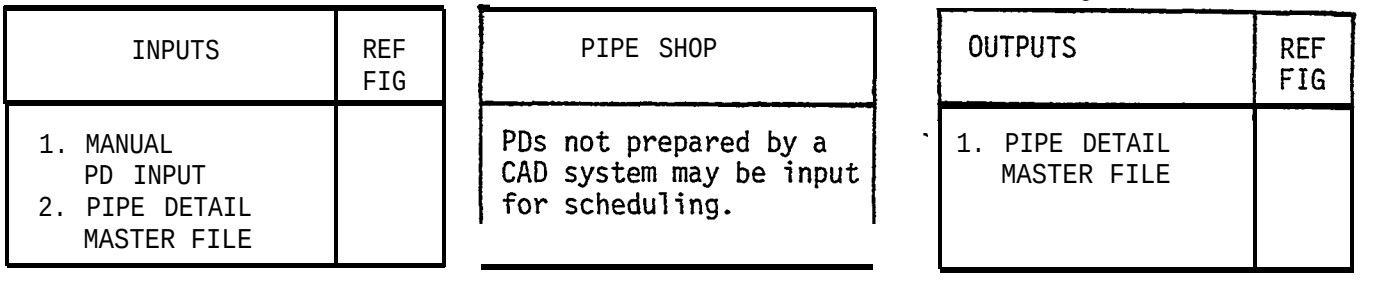
* Schedule Change Request - Reference Section III-l-L. This input specifies schedule parameter changes which cause a new/revised Production Schedule to be produced along with all other related outputs.

* PD Production Schedule Change Request File - Reference Section III-5-M.

PIPE HANDLING AND FABRICATION SYSTEM

19. Pipe Detail Master File Additions from Manual PDs

Figure II-19



The Pipe Shop superintendent may receive PDs for fabrication of pipe assemblies not available through the CAD system. To incorporate these into the Pipe Shop Production Schedule the PDs will be input into the Pipe Detail Master File. Then the Production Schedule Forecast may be requested to determine the effect of the new additions against the current schedule. Consideration must be made that data normally obtained from the PD Master Erection Schedule is input. Provision must be made for correcting the PD input.

* Manual PD Input - Reference Section III-3-L. Provides for input of pipe detail drawing data not generated from a CAD system.

* Pipe Detail Master File - Reference Section III-5-B.

SECTION III
INFORMATION REQUIREMENTS

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SECTION III

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SECTION III: INPUTS

l-A. PIPE ARRANGEMENT DRAWINGS

1. ORIGIN: When a new job is designed, each piping system in the hull will appear on a Pipe Arrangement Drawing. These drawings are then used to create the Pipe Detail Drawings.

2. DATA ELEMENTS: The Pipe Arrangement Drawings are used to show all pipe and materials that are used on each PD.

3. DISTRIBUTION: Engineering

4. FREQUENCY: Daily

SECTION III: INPUTS

l-B. MASTER ERECTION SCHEDULE

1. ORIGIN: Piping Section from the Production Master Erection Schedule for each job for pipe detail information only.

2. DATA ELEMENTS:

Hull Number

Job Number

Lay Keel Date

Launch Date

Delivery Date

For each Pipe Drawing:

Sequence Number

Description

Drawing Number

PD Number

Fabrication Start Date

Fabrication End Date

Installation Start Date

Installation End Date

3. DISTRIBUTION: Data Processing, Pipe Shop

4. FREQUENCY: When new hull contract or change

SECTION III: INPUTS

l-C. PD SCHEDULE FORECASTING REQUEST

1. ORIGIN: Pipe Shop Superintendent

2. DATA ELEMENTS:

Request Parameters:

- Job Number
- Hull Number
- Drawing Number
- PD Number
- Priority Code
- Time Frames
  - Start Date
  - Ending Date
- Production Hours

3. DISTRIBUTION: Data Processing

4. FREQUENCY: On request

COMMENTS:

Parameters are optional

SECTION III: INPUTS

l-D. PARTS CATALOG UPDATE

1. ORIGIN: From Engineering when new parts or suppliers are to be used.

2. DATA ELEMENTS:

Vendor Code

Piecemark Number

Piecemark Description

Item Type

Sub Type

Pressure

Pipe Schedule Number

Weight

Length (pipe)

Wall Thickness (pipe)

Number Dimensions

Dimensions (up to 30) - 1 position Alpha; 6 positions Numeric

3. DISTRIBUTION: Data Processing

4. FREQUENCY: As required

SECTION III: INPUTS

l-E. LIST OF MATERIAL UPDATE

1. ORIGIN: From Engineering and/or Material Control

2. DATA ELEMENTS:

   Job Number

   Hull Number

   Drawing Number

   Piecemark Number

   Quantity

   Date Required

   Purchase Order Date

   Quantity Ordered

3. DISTRIBUTION: Data Processing

4. FREQUENCY: When material requisitions are sent to Purchasing and when material is ordered.

SECTION III: INPUTS

l-F. MACHINE LOADING UPDATE

1. ORIGIN: New or changed work station or machine specifications as provided by the Plant Engineering & Maintenance Department.

2. DATA ELEMENTS:

	COMMENTS
Work Station Number	
Machine Type	Cutting, Bending, Treatment, etc.
Handling Code	4" Pipe, 8" Pipe, etc.
Load Capacity per operation code	Based upon handling type and machine type, how much time is required for the machine to complete the job from start to finish (setup, process, unload)?

1. Operation Code
2. Operation Description
3. Pipe (per pipe size)
   - Size
   - Operation Time
   - Set-up Time
4. Remarks
5. Alternate Work Station Number

Assy Code	Also voltage, current welding speed, other information based on weld type.

3. DISTRIBUTION: Data Processing

4. FREQUENCY: As required when new machine is installed or a machine changed.

SECTION III: INPUTS

l-G. PD COMPLETION NOTICE

1. ORIGIN: Completed by Pipe Shop
2. DATA ELEMENTS:

   Job Number

   Hull Number

   Drawing Number

   PD Number

   Schedule Completion Date

   Actual Completion Date
3. DISTRIBUTION: Data Processing
4. FREQUENCY: Daily

SECTION III: INPUTS

l-H. MACHINE DOWN-TIME UPDATE

1. ORIGIN: Pipe Shop
2. DATA ELEMENTS:

   Work Station Number

   Date Machine Down Time Started

   Time Machine Down Time Started

   Date Machine Ready for Production

   Time Machine Ready for Production
3. DISTRIBUTION: Data Processing
4. FREQUENCY: As required

SECTION III: INPUTS

1-1. WORK STATION PD COMPLETION

1. ORIGIN: Work Station Loading Report from each work station with those PDs processed at the work station checked as complete by the work station operator.

2. DATA ELEMENTS:

Work Station Number

Job Number

Hull Number

Drawing Number

PD Number

Schedule Completion Date at Work Station

Actual Completion Date at Work Station

3. DISTRIBUTION: Data Processing

4. FREQUENCY: Daily

SECTION III : INPUTS

1-J . MATERIAL OVER/UNDER INPUT

1. ORIGIN: Input by Material Control on receipt of material.

2. DATA ELEMENTS:

Job Number

Hull NUmber

Drawing Number

Piecemark Number

Quantity Ordered

Quantity Received

Material Received Date

Location

3. DISTRIBUTION: Data Processing

4. FREQUENCY: When material received

ECTION III: INPUTS

l-K. MATERIAL DELIVERED

1. ORIGIN: Material Control
2. DATA ELEMENTS:

   Piecemark Number

   Quantity Needed

   Quantity Delivered

   Date Delivered

   Location Delivered To
3. DISTRIBUTION: Data Processing
4. FREQUENCY: Daily

SECTION III: INPUTS

l-L. SCHEDULE CHANGE REQUEST

1. ORIGIN: Pipe Shop Superintendent after reviewing the schedule or the PD Production Schedule Forecast.

2. DATA ELEMENTS: COMMENTS:

Request Parameters: Parameters are optional

- Job Number
- Hull Number
- Drawing Number
- PD Number
- Priority Code
- Time Frames
  - Start Date
  - Ending Date
- Production Hours

3. DISTRIBUTION: Data Processing

4. FREQUENCY: On Request

SECTION III: OUTPUTS

2-A. PIPE PRODUCTION SCHEDULE

1. ORIGIN: Created by PHFS

2. DATA ELEMENTS:

Schedule Date(s)

PD Information (in sequence by scheduled entry into shop)

Drawing Number

PD Number

Job Number

Hull Number

Work Station Number

Operation Codes (by PD and/or PD cut lengths)

1. Surface Preparation

2. X-Ray Information

3. Welding

4. Cutting

5. Bending

6. Fittings

Fabrication Start Date

Fabrication End Date

Installation Start Date

Priority Code

3. DISTRIBUTION: Pipe Shop

4. FREQUENCY: Every two weeks

SECTION III: OUTPUTS

5. DISTRIBUTION: To each work station

6. FREQUENCY: Every two weeks (separated by day by PD)

SECTION III: OUTPUTS

2-B. WORKSTATION LOADING

1. ORIGIN: Created by PHFS
2. DATA ELEMENTS:

Schedule Date

Work Station Number/Description

Drawing Number

PD Number

Job Number

Hull Number

Pipe

1. Size
2. Type
3. Class
4. Cut Length

Operation Code

Piecemark Number(s)

Piecemark Description

Consumable Material Requirements

Machine Load Time

Route Code

Special Handling

Fabrication Start Date (From Schedule)

Fabrication End Date (From Schedule)

SECTION III: OUTPUTS

2-C. PIPE REQUEST

1. ORIGIN: Data Processing
2. DATA ELEMENTS:

   Production Schedule Date

   Pipe Required

   Piecemark Number

   Size

   Type

   Class

   Pipe Schedule Number

   Quantity
3. DISTRIBUTION: Pipe Shop
4. FREQUENCY: Every two weeks

SECTION III: OUTPUTS

2-D. MATERIAL REQUEST

1. ORIGIN: Data Processing
2. DATA ELEMENTS:

   Production Schedule Date From

   Production Schedule Date To

   Piecemark Number(s)

   Piecemark Description

   Total Quantity

   Daily - For Each Work Station:

   - Production Schedule Date
   - Quantity
   - Work Station Number

3. DISTRIBUTION: Pipe Shop
4. FREQUENCY: Every two weeks

SECTION III: OUTPUTS

2-E. ASSEMBLY MARKING INFORMATION

1. ORIGIN: Data Processing
2. DATA ELEMENTS:

   Production Schedule Date

   Job Number

   Hull Number

   Drawing Number

   PD Number

   Piecemark Number
3. DISTRIBUTION: Pipe Shop
4. FREQUENCY: Every two weeks
5. NOTE: Refer to Assembly Marking Information Figure II-2 regarding field run identification.

SECTION III: OUTPUTS

2-F. PD COMPLETION NOTICE

1. ORIGIN: Data Processing
2. DATA ELEMENTS:

   Job Number

   Hull Number

   Drawing Number

   PD Number

   Schedule Completion Date
3. DISTRIBUTION: Pipe Shop
4. FREQUENCY: Every two weeks (separated by schedule date)

SECTION III: OUTPUTS

2-G. PD PRODUCTION SCHEDULE FORECAST

1. ORIGIN: Created by PHFS
2. DATA ELEMENTS:

   Forecast Request Parameters

   Schedule Date(s)

   PD Information (in sequence by scheduled entry into shop)

   - Drawing Number
   - PD Number
   - Job Number
   - Hull Number
   - Operation Codes (by PD and/or PD cut lenghts)
     1. Surface Preparation
     2. X-Ray Information
     3. Welding
     4. Cutting
     5. Bending
     6. Fittings
   - Fabrication Start Date
   - Fabrication End Date
   - Installation Start Date
   - Priority Code

3. DISTRIBUTION: Pipe Shop
4. FREQUENCY: On request

SECTION III: OUTPUTS

2-H. WORK STATION LOADING FORECAST

1. ORIGIN: Created by PHFS
2. DATA ELEMENTS:

Forecast Request Parameters

Schedule Date(s)

Work Station Number/Description

Drawing Number

PD Number

- Job Number
- Hull Number
- Pipe
  1. Size
  2. Type
  3. Class
  4. Cut Length
- Operation Code
- Piecemark Number(s)
- Piecemark Description(s)
- Quantity
- Consumable Material Requirements
- Machine Load Time
  1. Set Up
  2. Process
  3. Unload
- Route Code
- Special Handling

SECTION III: OUTPUTS

Fabrication Start Date

Fabrication End Date

3. DISTRIBUTION: Pipe Shop

4. FREQUENCY: On request

SECTION III: OUTPUTS

2-I. PIPE SHOP STATUS REPORT

1. ORIGIN: Data Processing after processing of PD Completion Notice, Work Station PD Completion and Machine Down Time Update.

2. DATA ELEMENTS:

Schedule Date

Part 1: PDs Complete

Job Number

Hull Number

Drawing Number

PD Number

Part 2: PDs in Process

Job Number

Hull Number

Drawing Number

PD Number

Last Work Station Completed

Next Work Station

Part 3: Work Station PDs in Process

Work Station Number

Job Number

Hull Number

Drawing Number

PD Number

Number of PDs Completed

Number of PDs in Process

SECTION III: OUTPUTS

Part 4: Machine Down Time

Work Station Number

Date Machine Down Time Started

Time Machine Down Time Started

Date Machine Ready for Production

Time Machine Ready for Production

Hours/Minutes Machine Down

3. DISTRIBUTION: Pipe Shop

4. FREQUENCY: Daily

SECTION III: OUTPUTS

2-J PALLET CONTROL LIST

1. ORIGIN: Data Processing
2. DATA ELEMENTS:

   Drawing Number

   PD Number

   Job

   Hull

   Completion Date
3. DISTRIBUTION: Material Control
4. FREQUENCY: Daily

SECTION III: OUTPUTS

2-K. PALLET DELIVERY DATE CONTROL LIST

1. ORIGIN: Data Processing
2. DATA ELEMENTS:

   Drawing Number

   PD Number

   Job

   Hull

   Pallet Number

   Location

   Delivery Date
3. DISTRIBUTION: Material Control
4. FREQUENCY: When required. Day previous to delivery date.

SECTION III: OUTPUTS

2-L. RESERVE STATUS REPORT

1. ORIGIN: Created by PHFS
2. DATA ELEMENTS:

   Job Number

   Hull Number

   Drawing Number

   PD Number

   Reserve Status Code

   Fabrication Start Date (from PD Master Erection Schedule)

   Fabrication End Date (from PD Master Erection Schedule)

   Revision Number
3. DISTRIBUTION: Engineering
4. FREQUENCY: Weekly

SECTION III: OUTPUTS

2-M. PARTS CATALOG UPDATE

1. ORIGIN: Engineering
2. DATA ELEMENTS:

   Piecemark Number

   Piecemark Description

   Vendor Code

   Manufacturer’s Code

   Number of Dimensions

   Dimension (up to 30) - 1 position Alpha; 6 positions Numeric

   Pressure

   Item Type

   Sub Type

   Pipe Schedule Number

   Weight

   Length (Pipes)

   Wall Thickness (Pipe)
3. DISTRIBUTION: Data Processing
4. FREQUENCY: Updated when new material or vendor is to be used.

SECTION III: OUTPUTS

2-N. LIST OF MATERIALS

1. ORIGIN: Created by PHFS
2. DATA ELEMENTS:

   Job Number

   Hull Number

   Drawing Number

   Piecemark Number

   Piecemark Description

   Quantity

   Date Required
3. DISTRIBUTION: Material Control
4. FREQUENCY: When new material is added to the Master Material File

SECTION III: OUTPUTS

2-0. MATERIAL TO BE ORDERED

1. ORIGIN: Created by PHFS
2. DATA ELEMENTS:

   Job Number

   Hull Number

   Drawing Number

   Piecemark Number

   Piecemark Description

   Quantity

   Fabrication Start Date
3. DISTRIBUTION: Material Control
4. FREQUENCY: Daily as the PDs are added to the PD Detail Master File

SECTION III: OUTPUTS

2-P. CONSUMABLE REQUIREMENTS

1. ORIGIN: Created by PHFS
2. DATA ELEMENTS:

   Consumable Piecemark Numbers

   Quantity

   Production Schedule Dates
3. DISTRIBUTION: Material Control
4. FREQUENCY: Every two weeks

SECTION III: OUTPUTS

2-Q. MATERIAL OVER/UNDER

1. ORIGIN: Created by PHFS
2. DATA ELEMENTS:

   Job Number

   Hull Number

   Drawing Number

   Piecemark Numbers

   Quantity Ordered

   Quantity Received

   Over or Under Quantity

   Material Received Date

   Location
3. DISTRIBUTION: Material Control
4. FREQUENCY: When received, notice is entered.

SECTION III: OUTPUTS

2-R. MATERIAL ADDITIONAL PURCHASE

1. ORIGIN: Created by PHFS
2. DATA ELEMENTS:

   Job Number

   Hull Number

   Drawing Number

   Piecemark Number

   Piecemark Description

   Quantity

   Fabrication Start Date
3. DISTRIBUTION: Material Control
4. FREQUENCY: When material is short so that material can be transferred from one job to another

SECTION III: OUTPUTS

2-S. MATERIAL DELIVERED

1. ORIGIN: Created by PHFS
2. DATA ELEMENTS:

   Piecemark Number

   Piecemark Description

   Quantity Needed

   Quantity On Hand

   Quantity Delivered

   Quantity Short

   Location Delivered To

   Date Delivered
3. DISTRIBUTION: Pipe Shop
4. FREQUENCY: Daily

SECTION III: OUTPUTS

2-T. PIPE DRAWINGS

1. ORIGIN: Engineering

2. DATA ELEMENTS:

Three-Dimensional Pipe Drawing

Job Number

Hull Number

Drawing Number

PD Number

Revision Number

Sheet Number

Pipe Piecemark Numbers/Descriptions

Total Pipe Length

Cut Pipe Length

Material Piecemark Number/Descriptions

Machine Instructions

Route Codes

Reserve Status Code

3. DISTRIBUTION: Pipe Shop

4. FREQUENCY: Daily

SECTION III: OUTPUTS

2-U. PD HISTORY FILE REPORT

1. ORIGIN: Created by PHFS
2. DATA ELEMENTS:

Job Number

Hull Number

Drawing Number

PD Number

Pipe (for each different pipe specification required)

1. Size
2. Type
3. Class
4. Total Length
5. Cut Lengths
6. Piecemark Number

Surface Preparation

1. Cleaning
2. Treatment
3. Painting

X-Ray Information

Work Station Number

Actual Completion Date at Work Station

Machine Operation Codes

1. Welding
2. Cutting
3. Bending
4. Fittings

SECTION III: OUTPUTS

Material (for each operation code)

1. Piecemark Number
2. Quantity

Route Code

Special Handling

Fabrication Start Date

Schedule Date

Completion Date

Fabrication End Date

Installation Start Date

Revision Number

Priority Code

3. DISTRIBUTION: Pipe Shop

4. FREQUENCY: Every two weeks or as required

SECTION III: OUTPUTS

2-V. PIPE CUTTING REPORT

1. ORIGIN: Created by PHFS
2. DATA ELEMENTS:

   Schedule Day

   Pipe

   1. Type
   2. Class
   3. Size
   4. Piecemark Number

   Job Number

   Hull Number

   Drawing Number

   PD Number

   Cut Length

   Scrap
3. DISTRIBUTION: Pipe Shop
4. FREQUENCY: Every two weeks

SECTION III: OUTPUTS

2-W. MACHINE LOADING REPORT

1. ORIGIN: PHFS on input of the Machine Loading Update data.

2. DATA ELEMENTS:

Work Station Number

Machine Type

Handling Code

Load Capacity per operation code

1. Operation Code
2. Operation Description
3. Pipe (per pipe size)
   - Size
   - Operation Time
   - Set Up Time
4. Remarks
5. Alternate Work Station Number

Assy Code

Machine Down Time

1. Date Machine Down Time Started
2. Time Machine Down Time Started
3. Date Machine Ready for Production
4. Time Machine Ready for Production
5. Hours/Minutes Machine Down

SECTION III: ONLINE

3-A. PD DETAIL MASTER FILE DISPLAY

1. ORIGIN: On Request by Pipe Shop

2. DATA ELEMENTS:

Job Number

Hull Number

Drawing Number

PD Number

Pipe (for each different pipe specification required)

1. Size
2. Type
3. Class
4. Total Length
5. Cut Lengths
6. Piecemark Number

Surface Preparation

1. Cleaning
2. Treatment
3. Painting

X-Ray Information

Work Station Number

Actual Completion Date at Work Station

Operation Codes

1. Welding
2. Cutting
3. Bending

SECTION III: ONLINE

4. Fittings

Material (for each operation code)

i. Piecemark Numbers

2. Quantity

Route Code

Special Handling

Fabrication Start Date

Schedule Date

Completion Date

Fabrication End Date

Installation Start Date

Revision Number

Priority Code

3. DISTRIBUTION: Pipe Shop

4. FREQUENCY: On request

SECTION III: ONLINE

3-B. PD PRODUCTION SCHEDULE DISPLAY

1. ORIGIN: On Request by Pipe Shop

2. DATA ELEMENTS:

Schedule Date

Drawing Number

PD Number

Job Number

Hull Number

Work Station Number

Operation Codes (by PD and/or PD cut lengths)

1. Surface Preparation
2. X-Ray Information
3. Welding
4. Cutting
5. Bending
6. Fittings

Fabrication Start Date

Fabrication End Date

Installation Start Date

Priority Code

3. DISTRIBUTION: Pipe Shop

4. FREQUENCY: On Request

3-C. PD MASTER ERECTION SCHEDULE DISPLAY

1. ORIGIN: On request
2. DATA ELEMENTS:

   Job Number

   Hull Number

   Lay Keel Date

   Launch Date

   Delivery Date

   For each pipe drawing;

   PD Number

   Drawing Number

   Sequence Number

   Description

   Fabrication Start Date

   Fabrication End Date

   Installation Start Date

   Installation End Date
3. DISTRIBUTION: Pipe Shop
4. FREQUENCY: On request

SECTION III: ONLINE

3-D. PARTS CATALOG DISPLAY

1. ORIGIN: On Request
2. DATA ELEMENTS:

   Piecemark Number

   Piecemark Description

   Vendor Code

   Manufacturer’s Code

   Item Type

   Sub Type

   Number of Dimensions

   Dimensions (up to 30) - 1 position Alpha; 6 positions Numeric

   Pressure

   Pipe Schedule Number

   Weight

   Length (pipes)

   Wall Thickness (Pipe)
3. DISTRIBUTION: Pipe Shop
4. FREQUENCY: On request

SECTION III: ONLINE

3-E. WORKSTATION LOADING DISPLAY

1. ORIGIN: On Request by Pipe Shop
2. DATA ELEMENTS:

   Schedule Date

   Work Station Number/Description

   Drawing Number

   PD Number

   Job Number

   Hull Number

   Pipe

   1. Size
   2. Type
   3. Class
   4. Cut Length

   Operation Code

   Piecemark Number(s)

   Piecemark Descriptions

   Consumable Material Requirements

   Machine Load Time

   Route Code

   Special Handling

   Fabrication Start Date

   Fabrication End Date

3. DISTRIBUTION: Pipe Shop
4. FREQUENCY: On request

SECTION III: ONLINE

3-F. PD MASTER MATERIAL DISPLAY

1. ORIGIN: On Request by Material Control
2. DATA ELEMENTS:

   Drawing Number

   PD Number

   Job

   Hull

   Piecemark Number

   Piecemark Description

   Quantity

   Quantity Ordered

   Quantity Received Todate

   Quantity Delivered

   Quantity Not Scheduled

   Fabrication Start Date

   Delivery Date
3. DISTRIBUTION: Material Control
4. FREQUENCY: On request

SECTION III: ONLINE

3-G. PIECEMARK MASTER MATERIAL DISPLAY

1. ORIGIN: On Request by Material Control
2. DATA ELEMENTS:

   Piecemark Number

   Drawing Number

   PD Number(s)

   Job

   Hull

   Quantity Ordered

   Fabrication Date

   Purchase Order Date

   Last Material Received Date

   Quantity Received Todate

   Last Quantity Scheduled Todate

   Quantity Delivered

   Last Date Delivered

   Quantity Not Scheduled

   Location

   Fabrication Date

   Delivery Date
3. DISTRIBUTION: Material Control
4. FREQUENCY: On request

SECTION III: ONLINE

3-H. PD RESERVE STATUS

1. ORIGIN: On Request
2. DATA ELEMENTS:

   Job Number

   Hull Number

   Drawing Number

   PD Number

   Reserve Status Code

   Fabrication Start Date (From Erection Schedule)

   Fabrication End Date (From Erection Schedule)

   Revision Number

   Priority Code
3. DISTRIBUTION: Engineering
4. FREQUENCY: On request

SECTION III: ONLINE

3-I. MACHINE LOADING DISPLAY

1. ORIGIN: On Request

2. DATA ELEMENTS: COMMENTS

- Work Station Number
- Machine Type — Cutting, bending, treatment, etc.
- Handling Code — 4" pipe, 12" pipe, etc.
- Load Capacity per Operation Code — Based upon Handling Type & Machine Type, how much time is required for the machine to complete the job from start to finish (setup, process, unload)? Also current, voltage, welding speed, arc time, other welding information based on weld type.
  1. Operation Code
  2. Operation Description
  3. Pipe (per size)
     - Size
     - Operation Time
     - Set Up Time
  4. Remarks
  5. Alternate Work Station Number
- Assy Code
- Machine Down Time
  1. Date Machine Down Time Started
  2. Time Machine Down Time Started
  3. Date Machine Ready for Production
  4. Time Machine Ready for Production
  5. Hours/Minutes Machine Down

SECTION III: ONLINE

3: DISTRIBUTION: Pipe Shop or Plant Engineering and Maintenance

4. FREQUENCY: On request

SECTION III: ONLINE

3-J. PD PALLETIZING DISPLAY

1. ORIGIN: On request by Material Control
2. DATA ELEMENTS:

   Drawing Number

   PD Number

   Job

   Hull

   Pallet Number

   Location

   Delivery Date
3. DISTRIBUTION: Material Control
4. FREQUENCY: On request

SECTION III: ONLINE

3-K. CONSUMABLE FILE

1. ORIGIN: Material Control
2. DATA ELEMENTS:

   Item Number

   Description

   Quantity Delivered

   Quantity Expected Usage

   Last Delivery Date
3. DISTRIBUTION: Material Control
4. FREQUENCY: On request

SECTION III: ONLINE

3 - L . MANUAL PD INPUT

1. ORIGIN: On Request by Pipe Shop for input and correction of the PD input not generated from a CAD system.

2. DATA ELEMENTS:

Job Number

Hull Number

Drawing Number

PD Number

Pipe (for each different pipe specification required)

1. Size
2. Type
3. Class
4. Total Length
5. Cut Lengths
6. Piecemark Number

Surface Preparation

1. Cleaning
2. Treatment
3. Painting

X-Ray Information

Work Station Number

Operation Codes (for each operation)

SECTION III: ONLINE

1. Welding
2. Cutting
3. Bending
4. Fittings

Material (for each operation code)

1. Piecemark Number
2. Quantity

Route Code

Special Handling

Fabrication Start Date

Fabrication End Date

Revision Number

Priority Code

3. DISTRIBUTION: Pipe Shop

4. FREQUENCY: Daily

SECTION III: INTERFACES

4. SYSTEM INTERFACES

The two major systems that make up the SEMI-AUTOMATIC PIPE HANDLING SYSTEM will interface with each other. The COMPUTER-AIDED DRAWING SYSTEM will create the Pipe Drawing Detail Graphics File which will be used as input to the PIPE HANDLING AND FABRICATION SYSTEM. The PIPE HANDLING AND FABRICATION SYSTEM will create the PD Print Request File to go the COMPUTER-AIDED DRAWING SYSTEM to tell it what PDs to print.

The SEMI-AUTOMATIC PIPE HANDLING SYSTEM will not interface with any other computer system. If in the future a system is developed to handle Job Material Inventory, then the Pipe Handling System could interface with it to ensure that all materials required are on hand.

SECTION III: FILES

5-A PIPE DETAIL GRAPHICS FILE

1. ORIGIN: Engineering Graphics Piping System
2. DATA ELEMENTS:

Job Number

Hull Number

Drawing Number

PD Number

Pipe

1. Size
2. Type
3. Class
4. Total Length
5. Cut Lengths
6. Piecemark Number

Material

1. Piecemark Number

Surface Preparation

1. Cleaning
2. Treatment
3. Painting

X-Ray Information

Machine Operation Codes

1. Welding
2. Cutting
3. Bending
4. Fittings

SECTION III: FILES

Reserve Status Code

Revision Number

3. DISTRIBUTION: Data Processing

4. FREQUENCY: Updated daily

SECTION III: FILES

5-B PIPE DETAIL MASTER FILE

1. ORIGIN: Created by PHFS

2. DATA ELEMENTS:

Job Number

Hull Number

Drawing Number

PD Number

Pipe (for each different pipe specification required)

1. Size
2. Type
3. Class
4. Total Length
5. Cut Lengths
6. Piecemark Number

Surface Preparation

1. Cleaning
2. Treatment
3. Painting

X-Ray Information

Work Station Number

Actual Completion Date at Work Station

Operation Codes

1. Welding
2. Cutting
3. Bending
4. Fittings

SECTION III; FILES

Material

1. Piecemark Number
2. Quantity

Route Code

Special Handling

Fabrication Start Date

Schedule Date

Completion Date

Fabrication End Date

Installation Start Date

Revision Number

Priority Code

3. DISTRIBUTION: Created, updated, and maintained by Data Processing
4. FREQUENCY: Daily

SECTION III: FILES

5-C PD MASTER ERECTION SCHEDULE

1. ORIGIN: Production Planning
2. DATA ELEMENTS:

   Job Number

   Hull Number

   Lay Keel Date

   Launch Date

   Delivery Date

   PC) Information

      Sequence Number

      Description

      Drawing Number

      PD Number

      Fabrication Start Date

      Fabrication End Date

      Installation Start Date

      Installation End Date

3. DISTRIBUTION: Data Processing
4. FREQUENCY: Updated when new hull planned or revisions required

SECTION III: FILES

5-D. PARTS CATALOG

1. ORIGIN: Engineering
2. DATA ELEMENTS

   Piecemark Number

   Piecemark Description

   Vendor Code

   Manufacturer’s Code

   Item Type

   Sub Type

   Number of Dimensions

   Dimensions (up to 30) - 1 position Alpha; 6 position Numeric

   Pressure

   Pipe Schedule Number

   Weight

   Length (Pipe)

   Wall Thickness (Pipe)
3. DISTRIBUTION: Data Processing
4. FREQUENCY: Updated when new material or vendor is to be used

SECTION III: FILES

5-E MACHINE LOADING

1. ORIGIN: Created by Plant Engineering and Maintenance

2. DATA ELEMENTS: COMMENTS

Work Station Number

Machine Type — Cutting, bending, treatment, etc.

Handling Code — 4" pipe, 12" pipe, etc.

Load Capacity per operation code — Based upon Handling Type & Machine Type, how much time is required for the machine to complete the job from start to finish (setup, process, unload)? Also current, voltage, welding speed, arc time., other welding information based on weld type.

1. Operation Code
2. Operation Description
3. Pipe (per pipe size)
   Size
   Operation Time
   Set-Up Time
4. Remarks
5. Alternate Work Station Number

Assy Code

Machine Down Time

1. Date Machine Down Time Started
2. Time Machine Down Time Started
3. Date Machine Ready for Production
4. Time Machine Ready for Production
5. Hours/Minutes Machine Down

3. DISTRIBUTION: Created, updated, and maintained by Data processing

4. FREQUENCY: As required

5-F. PD PRINT REQUEST

1. ORIGIN: PHFS
2. DATA ELEMENTS:

   Job Number

   Hull Number

   Schedule Date

   Drawing Number

   PD Number/Sequence Number
3. DISTRIBUTION: GPS
4. FREQUENCY: Every two weeks

SECTION III: FILE

5-G PD HISTORY FILE

1. ORIGIN: Data Processing (PHFS)
2. DATA ELEMENTS:

Job Number

Hull Number

Drawing Number

PD Number

Pipe (for each different pipe specification required)

1. Size
2. Type
3. Class
4. Total Length
5. Cut Lengths
6. Piecemark Number

Surface Preparation

1. Cleaning
2. Treatment
3. Painting

X-Ray Information

Work Station Number

Actual Completion Date at Work Station

Operation Codes

1. Welding
2. Cutting
3. Bending
4. Fittings

SECTION III: FILES

Material (for each operation code)

1. Piecemark Number
2. Quantity

Route Code

Special Handling

Fabrication Start Date

Schedule Date

Completion Date

Fabrication End Date

Installation Start Date

Revision Number

Priority Code

3. DISTRIBUTION: Master History of all PDs processed by Pipe Shop
4. FREQUENCY: Updated every two weeks or as required

SECTION III: FILES

5-H PD PRODUCTION SCHEDULE

1. ORIGIN: Data Processing (PHFS)
2. DATA ELEMENTS:

   Schedule Date(s)

   PD Information (in sequence by scheduled entry into shop)

   - Drawing Number
   - PD Number
   - Job Number
   - Hull Number

   Operations Codes (by PD and/or PD cut lengths)

   1. Surface Preparation
   2. X-Ray Information
   3. Welding
   4. Cutting
   5. Bending
   6. Fittings

   Fabrication Start Date

   Fabrication End Date

   Priority Code

3. DISTRIBUTION: Data Processing
4. FREQUENCY: Created every two weeks

SECTION III: FILES

5-I WORKSTATION LOADING

1. ORIGIN: Data Processing (PHFS)
2. DATA ELEMENTS:

   Schedule Date

   Work Station Number/Description

   Drawing Number.

   PD Number

   Job Number

   Hull Number

   Pipe

   1. Size
   2. Type
   3. Class
   4. Cut Length

   Operation Code

   Piecemark Number(s)

   Consumable Material Requirements

   Machine Load Time

   Route Code

   Special Handling

   Fabrication Start Date

   Fabrication End Date

3. DISTRIBUTION: Data Processing
4. FREQUENCY: Created every two weeks

SECTION III: FILES

5-J PD MASTER MATERIAL FILE

1. ORIGIN: Engineering
2. DATA ELEMENTS:

   Piecemark Number
   Drawing Number

   Job

   Hull

   Quantity Ordered

   Delivery Date

   Purchase Order Date

   Last Material Received Date

   Quantity Received to Date

   Last Quantity Scheduled to Date

   Quantity Delivered

   Last Date Delivered

   Quantity not Scheduled

   Location
3. DISTRIBUTION: Data Processing
4. FREQUENCY: Updated by Purchasing, Material Control, and Data Processing

SECTION III: FILES

5-K PD PALLETIZING FILE

1. ORIGIN: Data Processing
2. DATA ELEMENTS:

   Drawing Number

   PD Number

   Job

   Hull

   Completion Date

   Pallet Number

   Location

   Delivery Date
3. DISTRIBUTION: Data Processing
4. FREQUENCY: Updated with new PD each day from the completion notices. Material Control will update with Pallet Number and Location when they receive the pallets.

SECTION III: FILES

5-L PD RESERVE STATUS FILE

1. ORIGIN: Created by Engineering
2. DATA ELEMENTS:

   Job Number

   Hull Number

   Drawing Number

   PD Number

   Reserve Status Code

   Revision Number
3. DISTRIBUTION: Data Processing
4. FREQUENCY: Update as required

SECTION III: FILES

5-M PD PRODUCTION SCHEDULE CHANGE REQUEST FILE

1. ORIGIN: Pipe Shop
2. DATA ELEMENTS:

   Request Parameters:

   - Job Number
   - Hull Number
   - Drawing Number
   - PD Number
   - Priority Code
   - Time Frames
     - Start Date
     - Ending Date
   - Production Hours

3. DISTRIBUTION: Data Processing
4. FREQUENCY: On request

SECTION III: FILES

5-N CONSUMABLE MASTER FILE

1. ORIGIN: Material Control
2. DATA ELEMENTS:

   Item Number

   Description

   Quantity Delivered

   Quantity Expected Usage

   Last Delivery Date
3. DISTRIBUTION: Data Processing
4. FREQUENCY: As required

SECTION IV
SYSTEM DESIGN CONSTRAINTS

SECTION IV

SYSTEM DESIGN CONSTRAINTS

The following factures must be considered during the detail design of the semi-automatic Pipe Detail Drawing Scheduling System.

* Performance - The objectives of the system is to produce drawings for and to schedule the fabrication of a minimum of 150 Pipe Details each workday.

* Data Base Currency - The system master data files must be updated daily or when new information is available to ensure accuracy of information.

* Backup and Recovery - Normal data processing data and system backup and recovery will be used.

* Field run pipe has not been considered in this set of requirements. This must be addressed during system design.

* These requirements have addressed the Semi-Automatic Pipe Shop only. Considerations for such things as pickling and galvanizing which are done outside the pipe shop must be addressed during system design.

APPENDIX A- DEPARTMENTAL RESPONSIBILITIES

ENGINEERING

* Create Bill of Material List
* Create the Graphics File
* Maintain the Graphics File
* Create the PD Reserve Status File
* Maintain the PD Reserve Status File
* Maintain the Parts Catalogue

PRODUCTION PLANNING

* Create the PD Master Erection Schedule File
* Maintain the PD Master Erection Schedule File
* Maintain Palletizing

MATERIAL CONTROL

* Pick and deliver pipe per the pipe request
* Maintain status of pipe delivered
* Pick and deliver material per the material request
* Maintain status of material delivered
* Pick and deliver machine work station consumables requirement use
* Maintain status of consumables delivered
* Maintain Pallet Delivery Data

PLANT ENGINEERING AND MAINTENANCE

* Create the Machine Loading File
* Maintain the Machine Loading File
* Create the Parts Catalog File

PRODUCTION PIPE SHOP

* Machine Down-Time Notice
* PD Completion Notice
* Create PD Production Schedule Change Request File
* Production Forecast Request

PURCHASING

* Expedite Late Deliveries

DATA PROCESSING

* Maintain the master files with data received from appropriate ASI Departments.
* Create the System Application Files using data stored in the System Master File.
* Generate the Pipe Shop Production Control System Deliverables by use of the System Application Files.
* Generate the Palletizing System Deliverables by use of the System Application Files.
* Maintain the System Application Files with data received from appropriate ASI Department.
* Create the System Historical File by pulling closed-out PDs from the System Master File.

APPENDIX B - CUSTOMER ORGANIZATION

PIPE SHOP

The Semi-Automatic Pipe Shop will require training the Pipe Shop personnel to effectively utilize the new semi-automatic system.

The personnel at the initial loading platform will require familiarization with the Pipe Request and Stock Inventory to properly interpret the type, size, class, quantity, and processing sequence of the pipes to be fed into the system.

The personnel throughout the Pipe Shop must be trained to operate the machines which will utilize the new automated control system. Use of the machine man-hour document for executing the machine operation codes, routing instructions, special handling instructions, or removal for special job will require training.

Administrative personnel will need training on the various documents and procedures for proper reporting.

Management personnel will need to be familiar with the new system concerning their particular responsibilities in order to monitor the production and shift the workload as necessary.

ENGINEERING

The Engineering Department will require training in the use of the new Graphics System. In addition to their internal training on the Graphics System, Engineering personnel will need to be familiar with the way their Graphics System ties in with Data Processing and the Pipe Shop Production Control System.

DATA PROCESSING

No special training required. Normal familiarization with files, procedures, and how program(s) operate are standard requirements.

MATERIAL CONTROL

Administrative personnel will need training on the various documents and procedures that will be provided to them to monitor the flow of material required to fabricate the piping units.

Management personnel will need to be familiar with the new system concerning their particular responsibilities in order to monitor the work flow.

PURCHASING

Purchasing will need to be familiar with the new system to aid Material Control with the expediting of late deliveries.

PRODUCTION PLANNING

Production Planning personnel will need training on the various procedures that will be provided to them to maintain a current Master Erection Schedule.

PLANT ENGINEERING AND MAINTENANCE

Plant Engineering and Maintenance personnel will need training on the various procedures that will be provided to them to maintain the Machine Loading File.

APPENDIX C - GLOSSARY OF TERMS

AS I	Avondale Shipyards, Inc.
ASSY CODE	Specifies the production lines in which the machine is physically located.
COMPLETION DATE	Represents the date which fabrication was completed on the PD.
CRT	On-line display terminals.
DRAWING NUMBER	Identifies which arrangement drawing the PD number belongs to.
ENDING DATE	Extracted from the Master Erection Schedule defining when the PD should be completed.
FILES	Machine readable collection of information used by the system.
GPS	Graphic Piping System used by Engineering.
HULL NUMBER	Unique number assigned to each ship built by ASI.
INPUTS	External forms of information that is to be used by the system.
INQUIRY	Ability to enter a request on an on-line terminal and receive information displayed back on the terminal.
JOB NUMBER	Unique number assigned to each job contracted by ASI.
MACHINE LOAD TIME	The time required for the machine to process a job from start to finish.
WORKSTATION NUMBER	Unique number assigned to each work station in the Pipe Shop.
OPERATION CODE(S)	Produced by the Graphic Piping System to specify the actual operation of the machine or work station.
MANUFACTURER CODE	A means of identifying the manufacturer of an inventory item.
OUTPUTS	Reports that are generated by the system
PD	Pipe Drawings.

PD NUMBER	Unique number assigned to each Pipe Drawing.
PIECEMARK	Unique identifying number for each inventory item.
PRIORITY CODE	Used to advance or delay the scheduled production of a PD.
PSPC	Pipe Shop Production Control System.
RESERVE STATUS CODE	Identifies the status of each PD showing if it should be scheduled for fabrication.
REVISION NUMBER	Number assigned by the Graphics Piping System and updated if the PD is revised.
ROUTE CODE	A means of identifying the next work station which is to process the PD.
SCHEDULE DATE	Represents the date which the system scheduled the PD to be processed through the Pipe Shop.
SPECIAL HANDLING	Used to signify an intervention of a job which must be done manually.
STARTING DATE	Extracted from the Master Erection Schedule defining when the PD should be started fabrication.